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HERPETOLOGY.—*Description of a new frog of the genus Eleutherodactylus from Jamaica, B.W.I.* W. GARDNER LYNN,¹ Catholic University of America.

In 1943 Lynn and Dent, in discussing the distribution of the Jamaican frog *Eleutherodactylus cundalli* Dunn, presented a new locality record as follows: "The present collections . . . provide the first record of its occurrence on the south coast. It is the only frog occurring on the hot dry limestones of Portland Ridge. Here it was found in deep caves, presumably the only places where there is sufficient moisture to enable it to survive. The cave specimens are very light gray in color, quite large in size and have a very tender skin that usually tears when the animals are captured."

This record was based on eight specimens taken in two different caves on Portland Ridge on August 19, 1941. Since that time C. B. Lewis, of the Institute of Jamaica, has collected six more specimens on various

trips to the region, and the present author, during a year spent in Jamaica (July 1952-September 1953) took 19 specimens in the course of seven visits to the caves. Study of this new material shows that the cave specimens represent a species which, though clearly related to *E. cundalli*, is quite distinct. Portland Ridge is a hilly limestone peninsula projecting into the sea from the south coast of Jamaica, connected with the main body of the island by a marshy plain. As Grant (1940) has pointed out it constitutes a sort of "biological island" with a certain degree of endemism in its fauna. It is therefore not surprising that the only *Eleutherodactylus* taken in the area proves to be distinct from other Jamaican forms.

Eleutherodactylus cavernicola, n. sp. (Fig. 1)

Type.—U. S. Nat. Mus. no. 135239, an adult female from Portland Cave, Clarendon Parish, Jamaica, B.W.I., collected June 28, 1953, by W. G. Lynn.

Paratypes.—U. S. Nat. Mus. nos. 117737-117744, collected August 19, 1941, by J. N. Dent and W. G. Lynn; U. S. Nat. Mus. nos. 135240-135257, collected October 24, 1952, to July 28, 1953, by W. G. Lynn; Museum of the

¹ Most of the material upon which this paper is based was collected by the author during the period from July 1952 to September 1953. During the summer of 1952 the work was aided by a grant from the National Science Foundation. Collections through the rest of the period were made during the author's tenure as a Fulbright Scholar at the University College of the West Indies. My gratitude is due to C. Bernard Lewis, director of the Science Museum of the Institute of Jamaica, for making available specimens collected by him and for guiding me to most of the caves visited.

Institute of Jamaica nos. 1943. 1, 1943. 2, collected April 20, 1943, by C. B. Lewis; Museum of the Institute of Jamaica nos. 1952. 8-1952.10, collected January 10, 1952, by C. B. Lewis. All the paratypes are from caverns on Portland Ridge within 4 miles of the type locality.

Diagnosis.—Resembles *Eleutherodactylus cundalli* Dunn in most characters but differs in having shorter hind limbs and a greater adult body size, and in the absence of any striking sexual dimorphism in the size of the tympanum.

Description of type.—Vomerine teeth in two long series extending laterally beyond the level of the choanae and converging backward medially; tongue oval, not deeply notched, free behind; greatest width of tongue two-thirds that of mouth opening; snout truncated as seen from above or in profile; upper jaw projecting beyond lower; nostrils lateral in position, much nearer to tip of snout than to eye; loreal region concave; diameter of eye equal to distance from eye to nostril; upper eyelid nearly as wide as interorbital space; eyelid with several small white tubercles; no ridges on head; no apparent subgular fold; diameter of tympanum one-half that of eye, separated from eye by a distance about one-half its own diameter; disks of two outer fingers enlarged, that of the second finger covering about one-third of the tympanum; disks of two inner fingers, and those of toes, small; first finger somewhat shorter than second; second finger shorter

than fourth; no webs between fingers or toes; third toe slightly longer than fifth; subarticular tubercles well developed; two metatarsal tubercles; a series of plantar tubercles corresponding to the metatarsals; no tarsal fold; heels not meeting when legs are flexed with femora held at right angles to the axis of the body; heel reaching only to posterior border of eye when hind leg is adpressed; back smooth without tubercles; belly smooth; granular glandular area on posterior surfaces of thighs below the vent.

Dimensions of type.—Tip of snout to vent, 40.5 mm; greatest width of head 15.0 mm; tip of snout to posterior edge of tympanum 14.0 mm; diameter of eye 4.5 mm; diameter of tympanum 2.5 mm; fore leg from axilla 21.5 mm; hind leg from vent to tip of longest toe 51.0 mm; hind leg from vent to heel 29.0 mm.

Colors in alcohol.—Back fawn color with an interocular bar and scattered spots of seal brown; upper surfaces of limbs fawn color; belly immaculate white; faint suffusions of seal brown on throat.

Colors in life.—The ground color of living specimens varies from light tan to coppery gray, with the interocular bar and the blotches on the back dark brown. The iris of the eye is a golden bronze with a longitudinal stripe of dark brown through the pupil. A few specimens show faint tinges of yellow in the groin.

Variation.—The 33 specimens studied show no

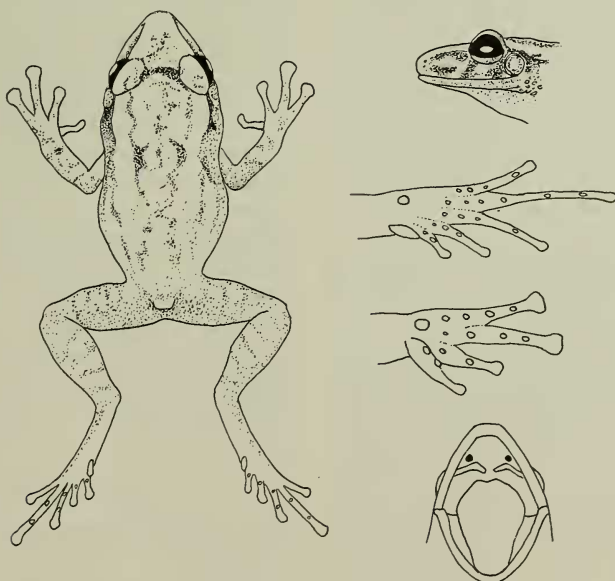


FIG. 1.—*Eleutherodactylus cavernicola*, n. sp. Sketch of dorsum and details of side of head and inside of mouth of type, $\times 1$. Foot and hand, $\times 2$.

significant variation in important characters. The adults range from 28.5 to 40.5 mm in length and average 33.5 mm. This is a considerably greater size than has been found in any population of *E. cundalli*. Because of the absence of any sexual dimorphism it is not possible to give a figure for average size of each sex. However, dissection of several of the largest specimens reveals that both males and females reach at least 38.0 mm. This is in contrast to *E. cundalli* in which females average about 5.0 mm longer than males.

The color pattern of all specimens accords closely with that illustrated for the type. All show a fairly well-defined interocular bar and dark lines extending over the tympanum. Aside from this the pattern consists of an irregular mottling of dark spots. It is noteworthy that no specimens exhibit the W-shaped mark in the suprascapular region, which is a common feature in *E. cundalli*, and there are no examples showing a middorsal light stripe.

Habits and habitat.—Some specimens were taken sufficiently near the entrances of the caverns to be exposed to the light, but others were found at various distances up to at least half a mile inside the caves. Most of the frogs were found on or near the floor, but on several occasions specimens were taken from among the draperylike folds of stalactites at 4–6 feet above the floor. Considering the number of collecting trips made, the total collection is small. This can not be taken to indicate that the population is sparse, however. Many of the specimens seen escaped by retreating into deep fissures. Moreover, several trips, during particularly dry periods, yielded no specimens at all. It may be assumed that at these times the frogs remain in the deeper passages where the moisture is retained.

A considerable amount of time was spent in turning rocks within the caves in the hope of finding the eggs of this frog. This was unsuccessful and, moreover, adult frogs were never found beneath rocks. In this connection it is noteworthy that there is only one juvenile individual in the entire collection. This is a rather badly shriveled specimen measuring 12.0 mm taken in 1943. It seems likely that the eggs are laid in deep, narrow fissures and that the young may prefer such situations, the frogs venturing into the larger parts of the caves only when they have reached adult size.

Whether this frog ever ranges far outside the caves is questionable. Turning rocks and logs in the region yielded small lizards and snakes but no frogs, even in the rainy season. The only other amphibian in the region is the introduced toad, *Bufo marinus*. Two adults were found near cave entrances and tadpoles were observed in the small sink hole which provides the water supply for the few families living near Jacksons Bay.

E. cavernicola, in contrast to *E. cundalli*, is a fairly vocal frog, the call consisting of a high-pitched oft-repeated chirp, which can be heard for considerable distances. Frogs were heard calling much more frequently during May to July than at other times of the year. This, together with the fact that females with large ovarian eggs were taken at this time only, probably indicates that the breeding season is limited to the summer months.

Only one of the caves of Portland Ridge is sufficiently well known to have a name. This, the Portland Cave, is marked on the road map of the Jamaica Automobile Association and is now accessible by road. It lies on the north side of the ridge within a mile of the end of Portland Point. This cave and two others in the immediate vicinity yielded most of the frogs in the collection. The others came from two caves lying on the south side of the ridge close to the base of the peninsula, near Jacksons Bay. One of these caves may be distinguished by the large vaulted entrance in which many of the columns and stalagmites are decorated with Arawak carvings. A number of other caves visited yielded no frogs but in some cases the visits were short or were made at particularly dry times. Most caves proved to have several entrances and extensive interconnections. Whether the caves of the northern tip of the point can be assumed to have direct connections with those on the south side is not clear but the frog populations of the two seem to be identical.

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PROCEEDINGS OF THE ACADEMY

471ST MEETING OF BOARD OF MANAGERS

The 471st meeting of the Board of Managers, held in the Tayloe Room of the Cosmos Club, April 20, 1954, was called to order by the President at 8 p.m., with the following in attendance: F. M. DEFANDORF, MARGARET PITTMAN, J. R. SWALLEN, J. A. STEVENSON, J. C. EWERS, W. W. DIEHL, M. A. MASON, S. E. FORBUSH, W. A. DAYTON, J. K. TAYLOR, F. W. POOS, G. F. GRAVATT, A. H. SCOTT, J. G. THOMPSON, F. N. FRENKIEL, and, by invitation, D. J. DAVIS and MARY JEANNE KREEK.

Dr. DAVIS, Chairman of the Committee on Meetings, reported that the May meeting would be held at the Army Map Service and would include a 45-minute discussion of the Army Map Service and an opportunity to see the Niovac in operation. The October meeting would be held at the Johns Hopkins University Applied Physics Laboratory, and the November meeting jointly with the Biological Society, with Dr. Konrad Lorenz, of Germany, as the speaker. The December meeting is being arranged by Dr. Seeger. It will be a panel type of discussion on science education with Dr. Samuel H. Brownell, Commissioner of Education, as one of the leaders.

Dr. McPHERSON presented revisions of the constitution and bylaws of the Junior Academy. After some discussion the matter was tabled until the next meeting of the Board. A proposal was made to publish a Red Book of the Junior Academy. This could be financed by the Junior Academy if distribution were only to members of the Junior Academy, but if sent to all members of the Washington Academy as well some assistance would be needed. The Board requested that plans and estimates be made by the Junior Academy to be presented at the next meeting. Dr. McPherson said that if any funds were left from the Science Fair they would be used to send Keith Johnson to the National Science Fair at Purdue University. It was estimated that the cost of the Science Fair would be about \$1,100. Mention was made of the economies effected by Mr. Johnson in planning the fair, especially the electric wiring which can be used year after year.

MARY JEANNE KREEK, on behalf of the Junior Academy, expressed her appreciation for the interest and assistance given by the senior Academy, especially in regard to the Science Fair.

President Defandorf read the minutes of the first meeting of the Committee on Science Education held on April 5:

The following people attended the first meeting of the Washington Academy of Sciences Committee on Science Education at the National Science Foundation on April 5 at 8 p.m.: RONALD BAMFORD, R. PERCY BARNES, GEORGE D. ROCK, B. D. VAN EVERA, and RAYMOND J. SEEGER, Chairman. The following individuals had indicated that they were unable to be present: WALLACE R. BRODE, HUGH L. DRYDEN, MARTIN A. MASON, WILLIAM H. SEBRELL, WALDO L. SCHMITT, WILLIAM E. WRATHER. In addition, the following were absent: CLIFFORD A. BETTS, LEONARD CARMICHAEL, and WILLIAM W. RUBEY.

There was general discussion as to what might be the most strategic functioning of the Committee. The Chairman emphasized the breadth of the problem. In the first place one might be concerned with curricula for the following: (1) General education in science for potential non-scientists and (2) special education for potential scientists. Secondly, one might consider the objectives and techniques for developing scientists from the following points of view: (1) the institutional sources of science teachers with due regard to curricula offerings and State requirements, (2) science implementation for active teachers (3) conferences with administrators (supervisors, principals, superintendents) responsible for the administration of science, and finally, (4) conferences with Boards of Education responsible for policies in science education.

It was generally agreed that the starting point of the Committee should be the well-known manpower need for scientists. The United States Office of Education figures for the past eight years indicate clearly that whereas the number of graduates at the baccalaureate level has increased 50 percent, there has been at best a constant level of graduates in the sciences (in some instances actually a decline). The questions generally are: What are the factors that are contributing to this state of affairs? How can the present situation be improved? Specifically, in what ways can the Washington Academy of Sciences be of assistance in solving the local problems?

It was agreed that the Chairman of the Committee might make contacts with the other State Academies of Sciences, particularly those in Maryland and Virginia, in order to ascertain whether any cooperative effort might be achieved for these States and whether any information might be available from other State Academies of Sciences as to their interest in this activity.

It was further agreed that there should be a meeting of the Committee with each of the following groups:

- (1) Science supervisors in District of Columbia, Montgomery County, Prince Georges County, Arlington County, and Fairfax County.
- (2) Professors of science education from the local universities.

(3) Local superintendents of education.

It was expected that only one of these meetings can be held this spring, namely, the one with the science supervisors. It is scheduled for 8 p.m. on May 25 in the Board Room of the National Science Foundation, 1520 H Street, NW.

It was further planned to devote one of the meetings of the Washington Academy of Sciences, possibly that of November 18, to a panel discussion of the general problem (the Commissioner of Education of the United States and the President of the National Academy of Sciences were suggested as possible participants).

The Chairman called attention to the following material for study in connection with the working material. In so far as possible he will try to obtain a copy of the public documents for each member of the Committee.

Education Policies Commission, N.E.A.: "Education of the Gifted" (1950)

U. S. Office of Education: "Mathematics in Public High Schools" (Bulletin 1953, No. 5)

U. S. Office of Education: "The Teaching of Sciences in Public High Schools" (Bulletin 1950, No. 9)

Carnegie Corporation of New York Conference at Harvard: "Critical Years Ahead in Science Teaching" (1953)

Following a reading of this report, the Board approved a special allotment of \$75 for expenses of the newly formed Committee on Science Education, as no provision had been made for expenses of this Committee when the 1954 budget was adopted.

The Secretary reported the results of the ballot vote on the affiliation of the District of Columbia Branch of the American Meteorological Society. Of the 321 votes cast, 320 were for affiliation and 1 against. Dr. FRANCIS W. REICHELDERFER, nominated for Vice-President representing the newly affiliated society, was elected by the Board.

President DEFANDORF presented statistics on the financial status of the Academy, particularly in relation to the JOURNAL, with the purpose of stimulating ideas "for improving and expanding the Academy's base of operations." These data showed that 85 percent of the income of the Academy was used for publication of the JOURNAL. After a rather extended discussion, Dr. Mason suggested that the Committee on Policy and Planning be given assistance with the request that they examine the total activities

of the Academy, particularly in respect to the JOURNAL. A motion that the President appoint a special committee of six or so members for this study was unanimously carried.

472D MEETING OF BOARD OF MANAGERS

The 472d meeting of the Board of Managers, held in the Tayloe Room of the Cosmos Club, May 18, 1954, was called to order by the President at 8 p.m. with the following in attendance: F. M. DEFANDORF, MARGARET PITTMAN, J. R. SWALLEN, H. S. RAPPELEYE, J. A. STEVENSON, J. C. EWERS, A. T. MCPHERSON, A. B. GURNEY, S. E. FORBUSH, G. F. GRAVATT, C. A. BETTS, GLEN SLOCUM, R. S. DILL, F. W. REICHELDERFER, and, by invitation, HEINZ SPECHT, H. N. EATON, and KEITH JOHNSON.

Dr. MCPHERSON again presented the revised constitution and bylaws of the Junior Academy. After commenting on some of the changes, he moved that the new constitution and bylaws be adopted. The motion was carried unanimously. A prospectus or dummy of the Red Book of the Junior Academy was presented, as well as estimates for printing based on 500 copies for the Junior Academy and 1,500 copies if the Academy wanted them for distribution. Printing of 1,500 copies was approved, the senior Academy to bear the expense of the additional copies. The distribution of these copies was left to the discretion of the Committee on Encouragement of Science Talent.

KEITH JOHNSON gave a report on the Science Fair. Fifty-five schools participated, 10 more than last year. There were 952 exhibits, of which 258 were from the seventh grade, 402 from the eighth and ninth grades, and 292 from senior high school. In all, 105 judges participated, and 300 student awards were given. Plaques were presented to 10 schools in special recognition for their work in the Fair. Two students were sent to the National Science Fair at Purdue University, and one of whom placed among the upper five.

The Secretary read a letter from CHARLES F. SWINGLE requesting that he be placed on the retired list. Having paid dues for 19 years, the request was approved, effective December 30, 1953.

JASON R. SWALLEN, *Secretary*.